

AMENDMENTS TO THE CLAIMS:

Claims 1-38 (cancelled)

39. (Previously Presented) A method of mounting an electronic component, said method comprising:

aligning in position bumps formed by wire-bonding on electrodes of said electronic component with electrodes of a circuit board, with interposition between said electronic component and said circuit board of insulative solid thermosetting resin;

softening to flow up to an edge of said electronic component, and then hardening, with heat, said thermosetting resin interposed between said electronic component and said circuit board, while achieving mutual pressing between said electronic component and said circuit board at a pressure of force of at least 20 gf per bump during leveling of said bumps and correcting of any warping of said circuit board, thereby bonding said electronic component and said circuit board together to achieve electrical connection between said mutual electrodes thereof; and

said hardening, said leveling and said correcting being achieved at approximately the same time.

40. (Previously Presented) A method as claimed in claim 39, wherein said achieving mutual pressing comprises pressing said electronic component toward said circuit board.

41. (Previously Presented) A method as claimed in claim 39, wherein said leveling and said correcting are achieved simultaneously with said hardening.

42. (Previously Presented) A method as claimed in claim 39, wherein said thermosetting resin comprises a sheet of thermosetting resin.

43. (Previously Presented) A method as claimed in claim 42, wherein said sheet has a thickness greater than a gap, existing after said bonding, between an active surface of said electronic component and a surface of said circuit board on which are formed said electrodes thereof.

44. (Previously Presented) A method as claimed in claim 39, wherein said thermosetting resin comprises a sheet of anisotropic thermosetting resin.

45. (Previously Presented) A method as claimed in claim 39, wherein said thermosetting resin comprises thermosetting resin adhesive.

46. (Previously Presented) A method as claimed in claim 39, wherein said thermosetting resin includes conductive particles.

47. (Previously Presented) A method as claimed in claim 46, wherein said particles comprise nickel particles plated with gold.

48. (Previously Presented) A method as claimed in claim 39, wherein, prior to said aligning, said thermosetting resin, in the form of a solid thermosetting resin sheet having a shape dimension smaller than an outside dimension of connection between said electrodes of said electronic component, is applied to said circuit board, and said hardening with heat comprises applying said heat to said sheet.

49. (Previously Presented) A method as claimed in claim 48, further comprising, prior to said aligning, applying conductive adhesive to said bumps.

50. (Previously presented) A method as claimed in claim 39, wherein, prior to said aligning, said thermosetting resin, in the form of a solid thermosetting resin sheet having on at least one surface thereof a flux layer, is applied to said circuit board, and said bonding is executed by said hardening said sheet while simultaneously performing said correcting by pressing said electronic component toward said circuit board by a heated head thereby causing said bumps to break through said sheet and causing said bumps to bond to said electrodes of said circuit board due to adhesion of a flux component of said flux layer to said bumps.

51. (Previously Presented) A method as claimed in claim 39, wherein, prior to said aligning, said thermosetting resin, in the form of a solid thermosetting resin sheet having holes formed at positions corresponding either to said bumps or to said electrodes of said circuit board and extending in a direction of extension of said bumps, with particles being embedded and electrically continuous in said holes, said particles comprising resin balls having surfaces plated with gold, nickel particles, conductive particles made of silver, silver-palladium or gold, conductive paste, or gold balls, is applied to said electrodes of said circuit board by positional alignment, and said bonding is executed by said hardening said sheet by application of heat thereto while conducting said pressing by forcing said electronic component toward said circuit board.

52. (Previously Presented) A method of mounting an electronic component, said method comprising:

aligning in position electrodes of said electronic component with electrodes of a circuit board, with interposition between said electronic component and said circuit board of insulative solid thermosetting resin;

softening to flow up to an edge of said electronic component, and then hardening, with heat, said thermosetting resin interposed between said electronic component and said circuit board, while achieving mutual pressing between said electronic component and said circuit board during correcting of any warping of said circuit board, thereby bonding said electronic component and said circuit board together to achieve electrical connection between said mutual electrodes thereof;

wherein, prior to said aligning, said thermosetting resin, in the form of a solid thermosetting resin sheet having holes formed at positions corresponding to said electrodes of said circuit board and extending in a direction of extension of said electrodes, with particles being embedded and electrically continuous in said holes, said particles comprising resin balls having surfaces plated with gold, nickel particles, conductive particles made of silver, silver-palladium or gold, conductive paste, or gold balls, is applied to said electrodes of said circuit board by positional alignment, and said bonding is executed by said hardening said sheet by application of heat thereto while conducting said pressing by forcing said electronic component toward said circuit board; and

wherein each of said particles has a size greater than a thickness of a passivation film to be coated on at least said electrodes of said electronic component and smaller than a thickness of one of said electrodes of said circuit board, and said bonding further is executed by applying ultrasonic vibrations to said electronic component.

53. (Previously Presented) A method as claimed in claim 39, further comprising applying conductive paste to said bumps, hardening said conductive paste to function as part of said bumps, and, during said bonding, forcing the thus hardened conductive paste through said thermosetting resin and forming electrical connections between said hardened conductive paste and said electrodes of said circuit board.

54. (Previously Presented) A method as claimed in claim 39, wherein said thermosetting resin comprises a thermosetting resin sheet on a side of said circuit board.

55. (Currently amended) ~~A method as claimed in claim 39~~ A method of mounting an electronic component, said method comprising:

aligning in position bumps formed by wire-bonding on electrodes of said electronic component with electrodes of a circuit board, with interposition between said electronic component and said circuit board of insulative solid thermosetting resin;

softening to flow up to an edge of said electronic component, and then hardening, with heat, said thermosetting resin interposed between said electronic component and said circuit board, while achieving mutual pressing between said electronic component and said circuit board at a pressure of force of at least 20 gf per bump during leveling of said bumps and correcting of any warping of said circuit board, thereby bonding said electronic component and said circuit board together to achieve electrical connection between said mutual electrodes thereof; and

said hardening, said leveling and said correcting being achieved at approximately the same time,

wherein said thermosetting resin comprises a thermosetting resin sheet on a side of said electronic component.

56. (Previously Presented) A method as claimed in claim 39, wherein said thermosetting resin comprises a thermosetting resin sheet having an anisotropic conductive film.

57. (Previously Presented) A method as claimed in claim 56, wherein said conductive film includes conductive nickel particles plated with gold.

Claims 58-76 (cancelled)

77. (Previously Presented) The method according to claim 39, further comprising correcting any warping of said electronic component at approximately the same time as hardening said thermosetting resin, leveling said bumps and correcting any warping of said circuit board.

78. (Previously Presented) The method according to claim 39, wherein hardening said thermosetting resin comprises applying heat of from 140°C to 230°C for from about several seconds to twenty seconds.

79. (Previously Presented) The method according to claim 39, wherein said circuit board is selected from the group consisting of a multilayer ceramic board, a glass cloth base epoxy copper clad laminate board, an aramid unwoven fabric board, a glass cloth base polyimide resin copper clad laminate board, and flexible printed circuit board.

Claims 80-82 (cancelled)

83. (Previously Presented) The method according to claim 52, further comprising correcting any warping of said electronic component and leveling said bumps at approximately the same time as hardening said thermosetting resin and correcting any warping of said circuit board.

84. (Previously Presented) The method according to claim 52, wherein hardening said thermosetting resin comprises applying heat of from 140°C to 230°C for from about several seconds to twenty seconds.

85. (Previously Presented) The method according to claim 52, wherein said circuit board is selected from the group consisting of a multilayer ceramic board, a glass cloth base epoxy copper clad laminate board, an aramid unwoven fabric board, a glass cloth base polyimide resin copper clad laminate board, and flexible printed circuit board.

86. (Previously Presented) The method according to claim 39, wherein hardening with heat said thermosetting resin while achieving the mutual pressing between said electronic component and said circuit board, during correcting of any warping of said circuit board, results in softening of said thermosetting resin.

Claim 87 (cancelled)

88. (Previously Presented) The method according to claim 52, wherein hardening with heat said thermosetting resin while achieving the mutual pressing between said electronic component and said circuit board, during correcting of any warping of said circuit board, results in softening of said thermosetting resin.

89. (Previously Presented) The method according to claim 39, wherein aligning in position bumps on electrodes of said electronic component with electrodes of a circuit board comprises aligning said bumps with said electrodes on said circuit board while holding said electronic component with a heated bonding tool,

softening to flow up to an edge of said electronic component, and then hardening, with heat, said thermosetting resin interposed between said electronic component and said circuit board comprises transferring heat from said heated bonding tool to said thermosetting resin, and

achieving mutual pressing between said electronic component and said circuit board at a pressure of at least 20 gf per bump comprises using said heated bonding tool to force said electronic component against said thermosetting resin.

90. (Previously Presented) The method according to claim 52, wherein aligning in position electrodes of said electronic component with electrodes of a circuit board comprises aligning said electrodes of said electronic component with said electrodes on said circuit board while holding said electronic component with a heated bonding tool, softening to flow up to an edge of said electronic component, and then hardening, with heat, said thermosetting resin interposed between said electronic component and said circuit board comprises transferring heat from said heated bonding tool to said thermosetting resin, and achieving mutual pressing between said electronic component and said circuit board comprises using said heated bonding tool to force said electronic component against said thermosetting resin.

91. (Previously Presented) The method according to claim 39, wherein said solid thermosetting resin includes an inorganic filler.

92. (Previously Presented) The method according to claim 52, wherein said solid thermosetting resin includes an inorganic filler.

Claim 93 (cancelled)

94. (Previously Presented) The method according to claim 39, wherein softening to flow up to an edge of said electronic component, and then hardening, with heat, said thermosetting resin, while achieving mutual pressing between said electronic component and said circuit board, comprises commencing the mutual pressing and application of said heat substantially simultaneously.

95. (Previously Presented) A method as claimed in claim 94, wherein said achieving mutual pressing comprises pressing said electronic component toward said circuit board.

96. (Previously Presented) A method as claimed in claim 94, wherein said leveling and said correcting are achieved simultaneously with said hardening.

97. (Previously Presented) A method as claimed in claim 94, wherein said thermosetting resin comprises a sheet of thermosetting resin.

98. (Previously Presented) A method as claimed in claim 97, wherein said sheet has a thickness greater than a gap, existing after said bonding, between an active surface of said electronic component and a surface of said circuit board on which are formed said electrodes thereof.

99. (Previously Presented) A method as claimed in claim 94, wherein said thermosetting resin comprises a sheet of anisotropic thermosetting resin.

100. (Previously Presented) A method as claimed in claim 94, wherein said thermosetting resin comprises thermosetting resin adhesive.

101. (Previously Presented) A method as claimed in claim 94, wherein said thermosetting resin includes conductive particles.

102. (Previously Presented) A method as claimed in claim 101, wherein said particles comprise nickel particles plated with gold.

103. (Previously Presented) A method as claimed in claim 94, wherein, prior to said aligning, said thermosetting resin, in the form of a solid thermosetting resin sheet having a shape dimension smaller than an outside dimension of connection between said electrodes of said electronic

component, is applied to said circuit board, and said hardening with heat comprises applying said heat to said sheet.

104. (Previously Presented) A method as claimed in claim 103, further comprising, prior to said aligning, applying conductive adhesive to said bumps.

105. (Previously Presented) A method as claimed in claim 94, wherein, prior to said aligning, said thermosetting resin, in the form of a solid thermosetting resin sheet having on at least one surface thereof a flux layer, is applied to said circuit board, and said bonding is executed by said hardening said sheet while simultaneously performing said correcting by pressing said electronic component toward said circuit board by a heated head, thereby causing said bumps to break through said sheet and causing said bumps to bond to said electrodes of said circuit board due to adhesion of a flux component of said flux layer to said bumps.

106. (Previously Presented) A method as claimed in claim 94, wherein, prior to said aligning, said thermosetting resin, in the form of a solid thermosetting resin sheet having holes formed at positions corresponding either to said bumps or to said electrodes of said circuit board and extending in a direction of extension of said bumps, with particles being embedded and electrically continuous in said holes, said particles comprising resin balls having surfaces plated with gold, nickel particles, conductive particles made of silver, silver-palladium or gold, conductive paste, or gold balls, is applied to said electrodes of said circuit board by positional alignment, and said bonding is executed by said hardening said sheet by application of heat thereto while conducting said pressing by forcing said electronic component toward said circuit board.

107. (Previously Presented) A method as claimed in claim 94, further comprising applying conductive paste to said bumps, hardening said conductive paste to function as part of said bumps, and, during said bonding, forcing the thus hardened conductive paste through said thermosetting resin and forming electrical connections between said hardened conductive paste and said electrodes of said circuit board.

108. (Previously Presented) A method as claimed in claim 94, wherein said thermosetting resin comprises a thermosetting resin sheet on a side of said circuit board.

109. (Previously Presented) A method as claimed in claim 94, wherein said thermosetting resin comprises a thermosetting resin sheet on a side of said electronic component.

110. (Previously Presented) A method as claimed in claim 94, wherein said thermosetting resin comprises a thermosetting resin sheet having an anisotropic conductive film.

111. (Previously Presented) A method as claimed in claim 110, wherein said conductive film includes conductive nickel particles plated with gold.

112. (Previously Presented) The method according to claim 94, further comprising correcting any warping of said electronic component at approximately the same time as hardening said thermosetting resin, leveling said bumps and correcting any warping of said circuit board.

113. (Previously Presented) The method according to claim 94, wherein hardening said thermosetting resin comprises applying heat of from 140°C to 230°C for from about several seconds to twenty seconds.

114. (Previously Presented) The method according to claim 94, wherein said circuit board is selected from the group consisting of a multilayer ceramic board, a glass cloth base epoxy copper clad laminate board, an aramid unwoven fabric board, a glass cloth base polyimide resin copper clad laminate board, and flexible printed circuit board.

115. (Currently amended) The method according to claim 94, wherein hardening with heat said thermosetting resin while achieving the mutual pressing between said electronic component and said circuit board, during correcting of any warping of said circuit board, results in softening of said thermosetting resin ~~and said circuit board~~.

116. (Previously Presented) The method according to claim 94, wherein aligning in position bumps on electrodes of said electronic component with electrodes of a circuit board comprises aligning said bumps with said electrodes on said circuit board while holding said electronic component with a heated bonding tool, softening to flow up to an edge of said electronic component, and then hardening, with heat, said thermosetting resin interposed between said electronic component and said circuit board comprises transferring heat from said heated bonding tool to said thermosetting resin, and achieving mutual pressing between said electronic component and said circuit board at a pressure of at least 20 gf per bump comprises using said heated bonding tool to force said electronic component against said thermosetting resin.

117. (Previously Presented) The method according to claim 94, wherein said solid thermosetting resin includes an inorganic filler.

118. (Previously Presented) The method according to claim 52, wherein softening to flow up to an edge of said electronic component, and then hardening, with heat, said thermosetting resin, while achieving mutual pressing between said electronic component and said circuit board, comprises commencing the mutual pressing and application of said heat substantially simultaneously.

119. (Previously Presented) The method according to claim 118, further comprising correcting any warping of said electronic component and leveling said bumps at approximately the same time as hardening said thermosetting resin and correcting any warping of said circuit board.

120. (Previously Presented) The method according to claim 118, wherein hardening said thermosetting resin comprises applying heat of from 140°C to 230°C for from about several seconds to twenty seconds.

121. (Previously Presented) The method according to claim 118, wherein said circuit board is selected from the group consisting of a multilayer ceramic board, a glass cloth base epoxy copper clad laminate board, an aramid unwoven fabric board, a glass cloth base polyimide resin copper clad laminate board, and flexible printed circuit board.

122. (Currently amended) The method according to claim 118, wherein hardening with heat said thermosetting resin while achieving the mutual pressing between said electronic component and said circuit board, during correcting of any warping of said circuit board, results in softening of said thermosetting resin ~~and said circuit board~~.

123. (Previously Presented) The method according to claim 118, wherein aligning in position electrodes of said electronic component with electrodes of a circuit board comprises aligning said electrodes of said electronic component with said electrodes on said circuit board while holding said electronic component with a heated bonding tool,

softening to flow up to an edge of said electronic component, and then hardening, with heat, said thermosetting resin interposed between said electronic component and said circuit board comprises transferring heat from said heated bonding tool to said thermosetting resin, and

achieving mutual pressing between said electronic component and said circuit board comprises using said heated bonding tool to force said electronic component against said thermosetting resin.

124. (Previously Presented) The method according to claim 118, wherein said solid thermosetting resin includes an inorganic filler.